IN THE CLAIMS

Please amend the claims to read as follows:

Listing of Claims:

1. (Previously Presented) Method of managing reorganizations in a set of indexed databases of an information data processing system adapted to "offline" reorganization in at least one reorganization processing region of the system, comprising the following operational phases:

(10) - Creating and maintaining by continuously updating a list PRIOREORG of objects to be organized in decreasing priority order as a function of the level of disorganization of the objects to be reorganized;

(20) - Executing a process IDPOR of identifying the first or next object to be reorganized POR with, at each event RAZR = 1 internal to the system for which the selection of the first or next object to be reorganized must be reviewed, interrupting, resetting and re-executing the process IDPOR, which comprises the following steps:

(21) - Establishing a rapid reorganization schedule PRR with the aid of the list PRIOREORG and the remaining operational time TRR available in all of the reorganization regions and a selection list SELECT/OR of objects OR to be reorganized in decreasing priority order optimized as a function of the benefit from the reorganization of each

object OR, said benefit being defined as the product of a factor representative of the level of disorganization of an object OR by the time to reorganize that object;

(22) - Establishing a retro-active reorganization schedule in which, for any current object OR to be reorganized extracted from the list SELECT/OR in increasing priority order to promote the processing in advance of any objects of larger sizes, there is calculated for each reorganization region the last time DDRR of the region, representing in the "Batch" window allocated to "offline" reorganization the minimum time necessary for reorganizing the current object OR, equal in the present instance to the time consumed DCRR plus the time DROR to reorganize the current object;

(23) - Identifying the processing region RTR of the current object OR by optimized matching of the processing time DRR available in said region with the processing time DROR necessary for reorganizing the object POR with minimum DRR - DDRR < 0;

(24) - Entering the current object OR as the next object to be reorganized POR in the schedule of the identified region by setting the pointer POR corresponding to the address of the current object OR and increasing the consumed time DCRR in the region by the reorganization time DROR;

(30) - Launching the reorganization of the object POR as soon as the identified reorganization processing region RTR is released in the

absence of any event RAZR = 1 occurring in the meantime; resetting and re-execution of the process IDPOR.

2. (Previously Presented) Method according to claim 1, wherein the optimum reorganization order is coordinated with the order of back-up copying of objects of the information system taking account of reorganizations in progress or just effected.

3. (Previously Presented) Method according to claim 2, wherein the back-up copying order is modified by executing with the highest priority, for at least one object OR to be reorganized, the copying of said object OR as soon as possible at the end of reorganization processing.

4. (Currently Amended) Method according to claim 1 of managing reorganizations of a set of indexed databases of an information system adapted to "offline" reorganization in at least one reorganization processing region, wherein the method integrates the organization of copying in at least one copying processing region and comprises the following operational phases:

(40) - Creating and maintaining by continuously updating:

- a list PRIOREORG of objects to be reorganized in decreasing priority order as a function of the level of disorganization of the objects to be reorganized; and

- a list PRIOCOPIE of objects to be copied in decreasing priority order as a function of the age of the last copies of the objects to be copied;

(50) - Continuously monitoring the occurrence in the information system of any event:

- RAZR = 1 for which the selection of the first or next object to be reorganized POR must be reviewed, in particular a reorganization task ending in a reorganization processing region and/or the release of a processing area for reorganization or copying; and/or

- RAZC = 1 for which the selection of the first or next object to copy POC must be reviewed, in particular at the end of a copying task in a copying processing region, priority copying at the end of reorganization and/or the release of a processing area for reorganization or copying, with for any event RAZR = 1, launching the execution of the process IDPOR of identifying the first object to be reorganized POR or, if the process IDPOR is being executed, interrupting and relaunching the process IDPOR; and/or

for an event RAZC = 1, launching execution of the process IDPOC of identifying the first object to be copied POC or, if the process IDPOC is being executed, interrupting and relaunching the process IDPOC;

- the process 1DPOR comprising the following operations:

(51) - Establishing a rapid reorganization schedule PRR* with the aid of the list PRIOREORG and the remaining reorganization operational time TRR available in all of the reorganization regions and a

selection list SELECT/OR of objects OR to be reorganized in decreasing priority order optimized as a function of the benefit from the reorganization of each object OR, said benefit being defined as the product of a factor representative of the level of disorganization of an object OR by the time to reorganize that object;

(52) - Establishing a rapid copying schedule PRC from the list SELECT/OR, and then establishing, from the list PRIOCOPIE and within the limit of the remaining copying operational time TRC available in all of the copying regions, a selection list SELECT/0C in LIFO or stack memory for objects 0C to be copied stacked in decreasing priority order;

(53') - Setting up a retro-active copying schedule in which, for any current object to be reorganized extracted from the list SELECT/OR in increasing priority order, the time TCR to be reserved for copying the object OR after reorganization is calculated for each copying region;

(54) - Setting up a retro-active reorganization schedule in which, for any current object OR to be reorganized extracted from the list SELECT/OR in increasing priority order to promote the processing in advance of objects of the greatest possible sizes, the last time DDR of the region is calculated for each reorganization region, representing in the "Batch" window allocated to "offline" reorganization the minimum time necessary for reorganizing the object

OR, in accordance with a different formulation according to whether a copy of the object OR being reorganized must be made or not;

(55) - Identifying the processing region RTR of the current object OR by optimized matching of the processing time DRR available in said region with the processing time DROR necessary for reorganizing the current object OR with minimum DRR - DDL < 0 if no copying is to be done or with minimum absolute value of DRR - DDL and DROR + DOOR 5 DRR if copying is to be done;

(56) - Entering the current object OR as the next object to be reorganized POR in the schedule of the region identified by setting the pointer POR corresponding to the address of the object OR, increasing the consumed time DCRR in the region by the reorganization time DROR and recalculating the time DGRR wasted in the reorganization region because of copying the objects OR at the end of reorganization;

(60') - Launching the reorganization of the object POR immediately an identified reorganization processing region RTR is available and if there is no reset event RAZR = 1 in the meantime; resetting and re-executing the process IDPOR; and

- the process IDPOC comprising the following operations:

(51) - Establishing a rapid reorganization schedule PRR* with the aid of the list PRIOREORG and the remaining reorganization operational time TRR available and a selection list SELECT/OR of objects OR to be reorganized in decreasing priority order optimized as a function of the benefit from the reorganization of each object OR, said benefit

being defined as the product of a factor representative of the level of disorganization of an object OR by the time to reorganize that object;

(52) - Establishing a rapid copying schedule PRC from the list SELECT/OR, and then establishing, from the list PRIOCOPIE and within the limit of the remaining copying operational time TRC available in all the copying regions, a selection list SELECT/OC SELECT/OR in LIFO or stack memory for objects OC to be copied stacked in decreasing priority order;

(53) - Establishing a retro-active copying schedule with determination of the available copying times in the copying region, unsticking of the list SELECT/OC from top to bottom and searching for a copying region by matching the available copying time and the copying time of the current object OC to be copied so as to copy the largest possible objects, and marking the source of the reorganization or non-reorganization of the object to be copied; followed by

- identifying the processing region RTC of the object to be copied by matching the processing time available in said region with the processing time necessary for copying the current object OC; followed by

- entering the current object OC as the next object to be copied POC in the schedule of the identified region RTC by setting the pointer POC corresponding to the address of the object OC and reducing the

available processing time by the time to copy the object 0C retained as POC;

(60) - Launching the copying of the object POC immediately a copying processing region TRC identified is available and if there is no reset event RAZC = 1 in the meantime; resetting and re-executing the process IDPOC.

5. (Previously Presented) Method according to claim 4, integrating into the final phases of the process IDPOR for an object OR a phase of searching for one or more objects OR to be reorganized without copying OR in the list SELECT/OR or by default in the list PRIOREORG liable to be reorganized in the corresponding processing region RTR during the time waiting for copying of the object OR after reorganization.

6. (Previously Presented) Method according to claim 4, wherein said phase (51) of establishing a rapid reorganization schedule PRR* comprises the following operations:

(511) - Initialization: wherein the selection indicators of the objects OR are eliminated and the review counter-limiter, the remaining copying time TRC, the remaining reorganization time TRR and the minimum time E for reorganizing and copying an object OR are initialized;

(512) - Loop on objects: wherein a 'selection possible' mark is applied for any real object OR from the list PRIOREORG processed in decreasing order until TRR < E;

(513) - Eliminating intersections of objects: real objects OR from table spaces also known as global objects already selected in whole or in part are eliminated from the 'selection possible' mark;

(514) - Reviewing preceding choices: wherein objects OR whose total reorganization and copying time is greater than the remaining reorganization time TRR are eliminated from the 'selection possible' mark, and by default the current object OR and the objects OR already selected in the list SELECT/OR are subjected to a process of optimization as a function of the reorganization benefit with replacement of an object already selected by the current object with tests, within the limit of the term of the counter-limiter, of successive combinations tending to retain to be finally selected in the SELECT/OR list of objects with the greatest possible reorganization benefit and associating them with the other objects OR of the 'possible selection' mark so that the total time for reorganizing all of the objects OR retained is less than but as close as possible to the remaining reorganization time TRR;

(515) - Verifying the sufficiency of the available copying time in the remaining copying time TRC for each object OR currently being finally selected for reorganization, taking account of the reorganization

priority of the object OR relative to objects to be copied before it because of their higher copying priorities;

(516) - Selecting the current object OR in the list SELECT/OR: wherein the indicators of the current object OR and of the associated global object are set, where applicable the indicators of the deselected object or objects OR are eliminated, and TRR and TRC are decreased by the reorganization and copying times, respectively.

7. (Currently Amended) Method according to claims 4 wherein said phase (52) of establishing a rapid copying schedule PRC comprises the following operations:

(521) -Initialization: wherein on exiting a reorganization schedule PRR* the copy selection stacks PSC1 and PSC2 are emptied and the review counter-limiter, the remaining copying time TRC and the minimum time EC to copy an object OC to be copied are initialized;

(522) - Inspecting reorganization regions: wherein for all the regions, if the region is active, and if image copying of the object being reorganized is to be done and/or if image copying of any object OR from the list ~~SELECT/()R~~ SELECT/OR taken in decreasing priority order is to be done: for any sub-object liable to be copied separately, in particular a partition, the copying time of the sub-object of TRC is

subtracted and the sub-object is placed at the top of the first stack PSC1;

(523)- Processing the list PRIOCOPIE of objects to be copied: for any object OC to be copied from the list PRIOCOPIE taken in decreasing order until TRC < EC and absent from PSC1, the copying time of the sub-object 0C is subtracted from TRC and the sub-object OC is placed at the top of the second stack PSC2,

(524) - Stacking selection stacks: the stack PSC1 is placed on top of the stack PSC2 to constitute the list SELECT/OC.

8. (Previously Presented) Method according to claim 7 wherein said phase (53) of establishing a retro-active copying schedule in the process IDPOR comprises the following operations:

(531) Initializing the copying regions: wherein on exiting a reorganization schedule for all the copying regions, the consumed time DCRC of the region is set to zero;

(532) Determining the copying time TCR to be reserved: wherein for any real object from the list SELECT/OR scanned in increasing priority order and then taken as the current object OR to be reorganized:

- the time TCR to be reserved for copying the current real object OR is set to zero;

- if image copying of any object OR from the list SELECT/OR in increasing priority order is to be done: for any sub-object liable to be copied separately, in particular partition, a search is made for a copying region whose consumed time DCRC is minimal, the copying time of the sub-object is added to the consumed time DCRC of the current

region and the time TCR to be reserved for copying the current object (= maximum of the time TOR to be reserved for copying the current object and the consumed time DCRC in the region) is set.

9. (Previously Presented) Method according to claim 8, wherein retro-active reorganization scheduling phase (54) in the process IDPOR comprises the following operations:

(541) - Initialization: wherein for any reorganization region:

- Time DRR of the region = Time DFB of the 'Batch' window less the estimated relative time HRFR of the end of reorganization processing in progress in the region
- Time consumed in the region DCRR = 0
- Time wasted in the region DGRR = 0
- Pointer to the first object to reorganize in the current region = 0

(542) - Determining the last time DDRR of the reorganization region: wherein for any real object OR selected from the list SELECT/OR in increasing priority order: For each region, if image copying of the current object OR is to be done, calculating the last time of the region DDRR = reorganization time DROR of the current object + maximum of the time TCR to be reserved for copying the current object and the total consumed time DCRR of the region + the wasted time DGRR of the region;

- if not, calculating the last time DDR of the region = consumed time DCRR of the region + maximum of the reorganization time DROR of the current object and the wasted time DGRR of the region.

10. (Previously Presented) Method according to claim 9, wherein said phase of identifying the reorganization region RTR (55) comprises the following operations:

According to the type of current object OR to be reorganized:

(551) - Searching for the reorganization processing region liable to accommodate optimally an object OR to be reorganized without copying, comprising:

- searching for a region whose last time DDRR is minimal, and if the last time DDR of the current region is greater than the time DRR of the current region, searching for a region for which the time DRR of the current region minus the last time DDRR of the current region is minimal and positive or zero; if not

(552) - Searching for the reorganization region liable to accommodate optimally an object OR to be reorganized with copying, comprising:

- Searching for a region such that the absolute value of the time DRR of the region minus the last time DDRR of the current region is minimal and the reorganization time DROR plus the time TCR to copy the current object is less than or equal to the time DRR of the region.

11. (Previously Presented) Method according to claim 10, wherein said phase of writing the object OR into the schedule of the reorganization region RTR (56) comprises the following operations:
(561)- Writing the object OR as the next object to be reorganized POR: if image copying of the current object is to be done or the wasted time of the current region is equal to zero, the first object to be reorganized pointer POR of the current region is set to the address of the current object OR,
(562)- Updating DCRR and DGRR: wherein the reorganization time DROC of the current object is added to the consumed time DCRR of the current region and the wasted time DGRR of the current region is set to the last time DDRR of the current region minus the consumed time DCRR of the current region.

12. (Currently Amended) Method according to claim 4 wherein said phase (53') of establishing a retro-active copying schedule in the process IDPOC comprises the following operations:
(531')- Initializing the copying regions: wherein for all regions:
the region time DROOP is set to the "Batch" window time DFB less the estimated relative time HRFC of the end of the current copying processing,
-the consumed time DCRCOP of the region is set to zero,
- the pointer POC of the first object to be copied of the current region is set to zero,

(532') Unstacking and identifying the next object to be copied POC: wherein for any object from the stack PSC1/PSC2 scanned from top to bottom a current object OC to be copied is extracted when the copying time TCOC of the current object is less than or equal to the longest DRCOP;

To identify the copying processing region, searching for a region whose consumed time DCRCOP is minimal; in the event of a result in the affirmative, if the copying time TCOC of the current object is greater than DROOP minus DCRCOP a region is searched for in which DRCROP minus DCRCOP minus TCOC is minimal, positive or zero,

If no region is suitable, a region to copy is chosen for which the absolute value of DRCOP minus DCRCOP minus TCOC is negative and minimal and for which TCOC is less than or equal to DROOP;

If the current object belongs to the second stack PSC2, i.e. an object to be copied that does not result from a reorganization, the pointer POC of the object for the chosen current region is set to the address of the current object OC to write the object P00 into the schedule of the identified copying processing region RTC; and To terminate, the copying time TCOC is added to the consumed time DCRCOP of the current region.

13. (Previously Presented) Method according to claim 4, wherein said events RAZR = 1 and RARC = 1 internal to the system leading to reviewing the selection of the objects POR or POC are respectively the

end of a reorganization task in a reorganization processing region for the objects POR or the end of a copying task in a copying processing region for the objects POC, priority copying at the end of reorganization, and/or releasing of a processing area for the objects POR and POC.

14. (Previously Presented) Method according to claim 1 for managing reorganization of a set of indexed databases of an information data processing system adapted to the "online" reorganization and intended to operate in association with a management method according to any preceding claim, characterized in that it comprises at least the following operational phases:
- a phase of instantaneous analysis of at least one object OR to be reorganized from among the objects liable to be reorganized, in particular databases, partitions and/or indexes to be reorganized, and estimation of the overcost associated with the level of disorganization of the object OR to be reorganized;
- a phase of instantaneous estimation of the cost of online reorganization as a function of the size of said object OR to be reorganized and of the level of disorganization of said object OR to be reorganized; and
- a phase of determination of the minimum disorganization threshold Ds of the object OR to be reorganized above which threshold "online" reorganization may be launched for that object OR and where applicable

the effective launching of that online reorganization, the threshold Ds corresponding substantially to the minimum of the total of the estimated overcost of disorganization and the estimated cost of reorganization for the object OR concerned.

15. (Previously Presented) Method according to claim 14 wherein launching "online" reorganization is delayed pending a time window of reduced activity of the database concerned.

16. (Previously Presented) Method according to claim 14 for managing "online" and "offline" reorganization, wherein for an object OR to be reorganized selected as the first object POR to be reorganized priority is given to "Offline" reorganization, "online" reorganization being required only after the threshold Ds is crossed for the object POR concerned.

17. (Previously Presented) Method according to claims 14 for use for the reorganization of indexed table space databases, wherein for an object OR to be reorganized, the threshold Ds is defined, when U the hourly mean number of updates to the object OR is low, by an approximation given by the following formula F5':

$R = DsI^2r\ Co^*/2.I.c = 1$

in which:

r designates the mean number of rows or key-RID per page of the entire object, I designates the number of row or key-RID insertions for the indexes at the time in the object OR, Co* designates the hourly overcost when the object is totally disorganized, and c designates a machine parameter, the ratio of the access time E/S to the size Nbp of the object.

18. (Previously Presented) Method according to claim 17 for use for the reorganization of indexes, wherein, for an index, the threshold Ds = DsI is defined, when U the hourly mean number of updates to the index is low, by an approximation given by the following formula F7':

$R = DsI^2\ r(t^*+1)Nbp.V/[2(V+3)] = 1$

in which:

$V = Ts/TI$,

Ts designates the arm displacement time, TI designates the latency time (1/2 arm turn), $c = (Ts+ 3.TI)/Nbp$, and t* designates the rate of rereading of the object, corresponding to the mean number of times that an entry will be reread.

19. (Previously Presented) Method according to claim 17 for use for the reorganization of indexed monotable space databases with n indexes, wherein the threshold Ds = DsT is defined for a monotable space, when U, the hourly mean number of updates to the monotable

space, is low, by an approximation given by the following formula F13':

$$R = r.Nbp[DsT^2.L\ (V + 1) + V.S(DsT^2 - bi^2)\ (t*i + 1)]/(2V + 6) = 1$$

in which:

L designates the proportion of rows accessed per sequential scan to the number of rows created, S represents the mathematical symbol Σ, denoting the sum of the expressions f(xi) for values of the index i from 1 to n, bi represents the instantaneous values of the disorganisation factor D of the monotable space, at the time of the last reorganizations of the n indexes, and t*i represents the rate of direct access via each index i.

20. (Previously Presented) Method according to claim 1 for used for managing reorganization of indexed table space databases.

21. (Previously Presented) Method according to claim 1 used within a date processing system comprising hardware and software means adapted for "offline" reorganization of indexed table space databases.

22. (Previously Presented) Method of managing reorganization of a set of indexed databases of an information data processing system adapted to the "online" reorganization comprising at least the following operational phases:

- a phase of instantaneous analysis of at least one object OR to be reorganized from among the objects liable to be reorganized, in particular databases, partitions and/or indexes to be reorganized, and estimation of the overcost associated with the level of disorganization of the object OR to be reorganized;
- a phase of instantaneous estimation of the cost of "online" reorganization as a function of the size of said object OR to be reorganized and of the level of disorganization of said object OR to be reorganized; and
- a phase of determination of the minimum disorganization threshold Ds of the object OR to be reorganized above which threshold "online" reorganization may be launched for that object OR and where applicable the effective launching of that "online" reorganization, the threshold Ds corresponding substantially to the minimum of the total of the estimated overcost of disorganization and the estimated cost of reorganization for the object OR concerned.

23. (Previously Presented) Method according to claim 22 for use for the reorganization of indexed table space databases, wherein for an object OR to be reorganized, the threshold Ds is defined, when U the hourly mean number of updates to the object OR is low, by an approximation given by the following formula F5':

$R = Ds^2 r\ Co^* / 2.I.c = 1$

in which:

r designates the mean number of rows or key-RID per page of the entire object, I designates the number of raw or key-RID insertions for the indexes at the time in the object OR, Co* designates the hourly overcost when the object is totally disorganized, and c designates a machine parameter, the ratio of the access time E/S to the size Nbp of the object.

24. (Previously Presented) Method according to claim 23 for use for the reorganization of indexes, wherein, for an index, the threshold Ds = DsI is defined, when U the hourly mean number of updates to the index is low, by an approximation given by the following formula F7':

$R = Ds/^2\ r(t^*+1)Nbp.V\ /[2(V+3)] = 1$ in which:

V = Ts/TI, Ts designates the arm displacement time, Tl designates the latency time (1/2 arm turn), c = (Ts+ 3.TI)/Nbp, and

t* designates the rate of rereading of the object corresponding to the mean number of times that an entry will be reread.

25. (Previously Presented) Method according to claim 23 for use for the reorganization of indexed monotable space databases with n indexes, wherein the threshold Ds = DsT is defined for a monotable space, when U, the hourly mean number of updates to the monotable space, is low, by an approximation given by the following formula F13':

$R = r.Nbp[DsT^2.L\ (V + 1) + V.S(DsT^2 - bi^2)\ (t*i + 1)]/(2V + 6) = 1$

in which:

L designates the proportion of rows accessed per sequential scan to the number of rows created, S represents the mathematical symbol Σ, denoting the sum of the expressions f(xi) for values of the index i from 1 to n, bi represents the instantaneous values of the disorganisation factor D of the monotable space, at the time of the last reorganizations of the n indexes, and t*i represents the rate of direct access via each index i.